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| FORM PTO-1390 REV. 5-93 | | US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE | ATTORNEYS DOCKET NUMBER P00,1984 |
| TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371 | | | U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/744221 |
| INTERNATIONAL APPLICATION NO. PCT/DE99/01997 | INTERNATIONAL FILING DATE 1 July 1999 | PRIORITY DATE CLAIMED 22 July 1998 | |
| TITLE OF INVENTION "METHOD FOR CONNECTING TERMINALS TO EXTERNAL MODEMS" | | | |
| APPLICANT(S) FOR DO/EO/US Thomas THEIMER | | | |
| Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information: | | | |
| <ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay. 4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. 5. <input checked="" type="checkbox"/> A copy of International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) d. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). 6. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 7. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 8. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 9. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). | | | |
| Items 11. to 16. below concern other document(s) or information included: | | | |
| <ol style="list-style-type: none"> 11. <input type="checkbox"/> An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; (PTO 1449, Prior Art, Search Report). 12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. (SEE ATTACHED ENVELOPE) 13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 14. <input type="checkbox"/> A substitute specification. 15. <input checked="" type="checkbox"/> A change of power of attorney and/or address letter. 16. <input checked="" type="checkbox"/> Other items or information: <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> Submittal of Drawings b. <input checked="" type="checkbox"/> EXPRESS MAIL #EL 655301001US, dated January 22, 2001. | | | |

17. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5)):**

Search Report has been prepared by the EPO or JPO \$860.00

International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) .. \$700.00

No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but
international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) \$770.00Neither international preliminary examination fee (37 C.F.R. 1.482) nor international
search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO \$1040.00International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all
claims satisfied provisions of PCT Article 33(2)-(4) \$ 96.00**ENTER APPROPRIATE BASIC FEE AMOUNT =**

CALCULATIONS

PTO USE ONLY

\$ 860.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months
from the earliest claimed priority date (37 C.F.R. 1.492(e)).

\$

Claims

Number Filed

Number
Extra

Rate

Total Claims

10 - 20 =

X \$ 18.00

\$

Independent Claims

1 - 3 =

X \$ 80.00

\$.00

Multiple Dependent Claims

\$270.00 +

\$

TOTAL OF ABOVE CALCULATIONS =

\$ 860.00

Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must
also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)

\$

SUBTOTAL =

\$ 860.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months
from the earliest claimed priority date (37 CFR 1.492(f)).

\$

+

TOTAL NATIONAL FEE =

\$ 860.00

Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be
accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). \$40.00 per property

+

TOTAL FEES ENCLOSED =

\$ 860.00

Amount to be
refunded

\$

charged

\$

a. ☒ A check in the amount of \$ 860.00 to cover the above fees is enclosed.b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A
duplicate copy of this sheet is enclosed.c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. 501519. A duplicate copy of this sheet is enclosed.NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be
filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

SIGNATURE

Schiff Hardin & Waite
Patent Department
6600 Sears Tower
Chicago, Illinois 60606Melvin A. Robinson
NAME31,870
Registration Number

- 1 -

IN THE UNITED STATES ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

"PRELIMINARY AMENDMENT"

5 APPLICANT: Thomas THEIMER

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/DE99/01997

INTERNATIONAL FILING DATE: 1 July 1999

10 INVENTION: METHOD FOR CONNECTING TERMINALS TO
EXTERNAL MODEMS

Hon. Assistant Commissioner for Patents
Box PCT
Washington D.C. 20231

15 SIR:

Amend the above-identified international application before entry into the
national stage before the U.S. Patent & Trademark Office under 35 U.S.C. §371
as follows:

IN THE SPECIFICATION

20 On page 1, before the title, insert --

SPECIFICATION

TITLE--;

after the title, insert --

BACKGROUND OF THE INVENTION

Field of the Invention--;

in line 3, before "invention" insert --present--;

in line 4, change "devices an modems" to --devices and modems--;

5 after line 5, insert --

Description of the Related Art--;

in line 6, after "ADSL" insert --(Asymmetric Digital Subscriber Line)--;

in line 7, before "future" insert --the--;

in line 11, change "plugin" to --plug-in--;

10 in line 18, before "interface" insert --an--, before "terminal" insert --a- and
before "modem" insert --a--;

in line 19, after "PPP" insert --(point to point protocol)--; and

in line 21, after "For this purpose," insert --the publication--.

On page 2, after line 5, insert --

15 **SUMMARY OF THE INVENTION--;** and

in line6, replace "The" with --An--.

On page 3, in line 9, change "dat" to --data--;

after line 11, insert --

BRIEF DESCRIPTION OF THE DRAWINGS--;

20 in lines 13 and 14, delete "SHown are:";

in line 15, after "Figure 1" insert --is a block diagram showing--;

in line 17, after "Figure 2" insert --is a chart showing--;

after line 18, insert --

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS--;

25 in line 19, change "3, 4" to --3 and 4--;

in line 21, change "3, 4" to --3 and 4--;
in line 22, change "1, 2" to --1 and 2--;
in line 23, change "1, 2" to --1 or 2--;
in line 24, change "3, 4" to --3 or 4";
5 in line 25, change "steps S1, S2" to --steps S1 and S2--;
in line 26, change "1, 2" to --1 or 2--;
in line 27, change "3, 4" to --3 and 4--;
in line 29, delete "leading thereto that" and insert --leads to--; and
in line 30, change "request is received by all modems 3, 4" to --request
10 being received by all of the modems 3 and 4--.

On page 4, in line 1, change "3, 4" to --3 and 4--;
in line 2, before "modem reply" insert --a-- and change "1, 2" to --1 or 2--;
in line 4, change "1, 2" to --1 or 2-- and change "3, 4" to --3 or 4--;
in line 5, replace "S5, S6 [sic]" with --S3 and S4--;
15 in line 9, before "terminal" insert --the-- and before "modem" insert --the--
;

in line 13, change "S5, S6" to --S5 and S6--;
in line 20, change "S7, S8" to --S7 and S8--;
in line 22, before "modem" insert --the--; and
20 in line 23, before "terminal device" insert --the--.

On page 5, in line 3, change "S9, S10" to --S9 and S10--;
in line 4, before "terminal" insert --the-- and before "modem" insert --the--
;
in line 5, before "controlled" insert --a--;
25 in line 9, before "terminal" insert --the--;

in line 10, before "modem" insert --the-- and change "an including" to --
and including--;

in line 11, before "terminal" insert --the--; and

in line 12, before "modem" insert --the--.

5

On page 6, in line 26, before "terminal" insert --the-- and before "modem"
insert --the--.

On page 7, before "controlled" insert --a--.

On page 8, in line 2, before "known" insert --the--; and

in line 22, after "SW" insert --(software)--.

10

On page 9, after line 10, add the following new paragraph --

Although other modifications and changes may be suggested by those
skilled in the art, it is the intention of the inventors to embody within the patent
warranted hereon all changes and modifications as reasonably and properly come
within the scope of their contribution to the art.--.

15

IN THE CLAIMS

On page 10, line 1, change "Patent Claims" to --I Claim:--.

Amend the claims as follows:

1. (Amended) A method [Method] for connecting terminal devices [(1, 2)]
to external modems [(3, 4)], [whereby] a plurality of modems [(3, 4)] can enter into
connection] being capable of connecting with the terminal devices [(1, 2)] with a
local network [(6)], comprising the steps of: [whereby the following steps are
implemented for the]

20

implementing a connection setup between one of the plurality of terminal devices [(1, 2)] and one of the modems [(3, 4)], including:

[–] sending a search request from [the] a corresponding terminal device [(1, 2)] to all modems [(3, 4)] that are connected to the local network [(6)];

[–] returning a reply to the corresponding terminal device [(1, 2)] from [those] said modems [(3, 4)] that have free resources available;

[–] selecting one of the modem [(3, 4)] that sent a reply with the corresponding terminal device [(1, 2)]; and

[–] establishing a connection setup [proceeding] from the corresponding terminal device [(1, 2)] to the selected modem [(3, 4)] by exchanging control information.

2. (Amended) A method [Method] according to claim 1, wherein [characterized in that] the external modems are ADSL modems [(3, 4)].

3. (Amended) A method [Method] according to claim 1, wherein [one of the preceding claims, characterized in that] the local network is an Ethernet network [(6)].

4. (Amended) A method [Method] according to claim 1, further comprising the step of: [one of the preceding claims, characterized in that] exchanging information for the connection setup and for setting the external modems [(3, 4) are exchanged] between the terminal devices [(1, 2)] and the external modems [(1, 2) [sic]] via an integrated control channel.

5. (Amended) A method [Method] according to claim 1, wherein [one of

the preceding claims, characterized in that] the search request includes [contain
[sic]] further particulars about at least one of a [the] required bandwidth and a [/or
the] required protocol, and only those modems [(3, 4)] that can meet all
requirements according to the further particulars reply to the search request of a
5 terminal device [(1, 2)].

6. (Amended) A method [Method] according to claim 1, further
comprising the step of: [one of the preceding claims, characterized in that]
implementing settings of the modem [(3, 4) are implemented] via an integrated
control channel proceeding from the terminal device [(1, 2)].

10 7. (Amended) A method [Method] according to claim 1, further
comprising the step of: [one of the preceding claims, characterized in that]
outputting start/stop commands from respective ones of the [respectively
receiving] terminal device [(1, 2)] or modem that receives exchanged data
[(3, 4) outputs start/stop commands] for [the] flow control of the
15 exchanged data with which [the] data transmission from respective ones of
the [respectively transmitting] terminal device [(1, 2)] or modem that
transmits the exchanged data [(3, 4)] is started or, respectively, stopped.

8. (Amended) A method [Method] according to claim 1, further
comprising the step of: [one of the preceding claims, characterized in that,]
20 following the connection setup, exchanging echo data at periodic intervals that
make it possible for the modem [(3, 4)] to recognize whether the terminal
device [(1, 2)] is still active [are exchanged at periodic intervals].

9. (Amended) A method [Method] according to claim 8, further comprising the step of: [characterized in that the connection is] automatically clearing [cleared] down the connection after a predetermined time when the modem [(3, 4)] or the terminal device [(3, 4) [sic]] has received no echo data during said predetermined [this] time.

10. (Amended) A method [Method] according to claim 1, further comprising the step of: [one of the preceding claims, characterized in that] exchanging release information [are exchanged] between the terminal device [(1, 2)] and the modem [(3, 4)] for clearing down the connection [cleardown] and releasing [the] resources of the connection [are] in turn [released].

IN THE ABSTRACT

Change the heading to --ABSTRACT OF THE DISCLOSURE--;
delete the title,
in the first line, replace "The following invention is directed to a" with --A--; and
in the last line, remove "Figure 1".

REMARKS

The foregoing amendments to the specification and claims under Article 41 of the Patent Cooperation Treaty place the application into a form for prosecution before the U.S. Patent and Trademark Office under 35 U.S.C. §371.

Accordingly, entry of these amendments before examination on the merits is hereby requested.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read 'Melvin A. Robinson', is written over a horizontal line.

Melvin A. Robinson (reg. no. 31,870)
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ATTORNEY FOR APPLICANT

- 1 -

IN THE UNITED STATES ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

"SUBMITTAL OF DRAWINGS"

5 APPLICANT: Thomas THEIMER

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/DE99/01997

INTERNATIONAL FILING DATE: 1 July 1999

10 INVENTION: METHOD FOR CONNECTING TERMINALS TO
EXTERNAL MODEMS

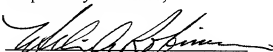
Hon. Assistant Commissioner for Patents
Box PCT
Washington D.C. 20231

15 SIR:

Enclosed is a copy of the single sheet of drawings showing Figures 1 and 2
as filed. Also enclosed is a second copy of the drawings on which the English
translation has been marked for the German text.

Respectfully submitted,

20


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25

ATTORNEY FOR APPLICANT

1/1

FIG 1

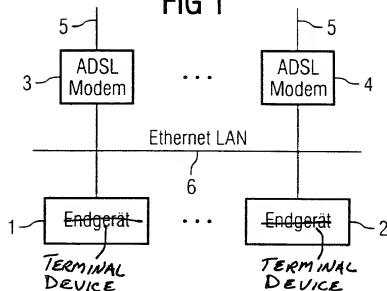
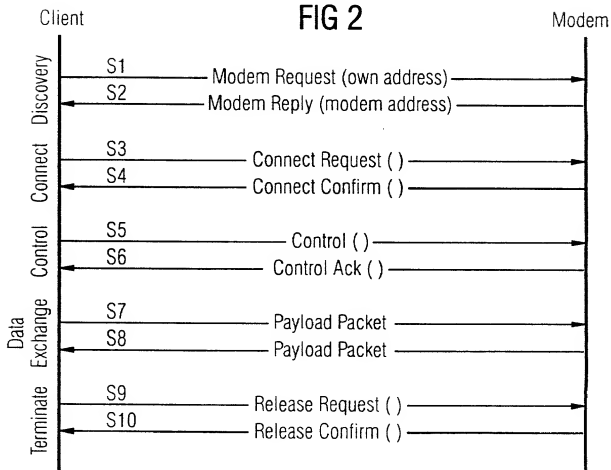


FIG 2



1/pps

METHOD FOR CONNECTING TERMINAL DEVICES TO EXTERNAL MODEMS

The invention is directed in general to a method for connecting terminal devices and modems and, stated more specifically, to a method for connecting terminal devices to external modems via local networks (LAN).

ADSL (or, generally, xDSL) modems will enable significantly faster Internet access in future compared to current modems. Similar to current analog modems, there will also be two versions for xDSL modems: external modems in their own housing that are connected via cable to the terminal device (client) as well as internal modems that are either permanently installed in the terminal device or are in the form of plugin cards that can also be subsequently installed.

External modems must be connected to the terminal device via corresponding interfaces, whereby what is referred to as the Ethernet is especially well-suited because of the high bandwidth and the low costs. Ethernet thereby has the advantage that a plurality of terminal devices can access one or more modems via a local network. This constellation is especially interesting, for example, in networks in small companies.

However, Ethernet as interface between terminal device and modem has the disadvantage that the conversion of the data packets (PPP packets) that are exchanged via the modem path onto the local network (LAN) is very involved.

For this purpose, T. Kwok et al., "An Interoperable End-to-end Broadband Service Architecture over ADSL Systems (Version 3.0)", ADSL Forum Contribution 97215, December 1997, proposes the employment of a future standard protocol (layer 2 tunneling protocol) with whose assistance PPP packets can be transmitted via the local network upon employment of UDP/IP. This solution, however, has a number of disadvantages:

1. The protocol known from the Prior Art is very complex and makes high demands of the modem.
2. The proposed protocol offers many functions that are not used for the application in the sense of the present invention.

3. The protocol requires the prior configuration of the IP addresses of terminal device (client) and modem. This, however, is very involved. What would be desirable, in contrast, is a plug-and-play configuration without prior configuration on the part of the user.

5 4. A direct control of the modem parameters is not possible.

The object of the present invention is therefore to avoid the aforementioned disadvantages of the Prior Art and to offer a technique for connecting terminal devices and modems via local networks that is particularly user friendly.

According to the present invention, a method for connecting terminal
10 devices to external modems is provided therefor wherein a plurality of modems can enter into communication with the terminal devices with a local network. A number of steps are implemented between one of the plurality of terminal devices and one of the modems for the connection setup. First, a search request is sent from the corresponding terminal device to all modems that are connected to the local network.
15 Those modems that have free resources respond with a reply to the inquiring terminal device. The terminal device subsequently makes a selection from the modem that sent a reply, and a connection setup ensues proceeding from the terminal device to the selected modem by exchanging control information.

The external modems can, in particular, be ADSL modems.

20 The local network can, in particular, be an Ethernet network.

Information for the connection setup and for setting the external modems can be exchanged between the terminal devices and the external modems via an integrated control channel.

The search request can contain further particulars about the required
25 bandwidth and/or the required protocol, whereby only those external modems that can meet all requirements according to the further particulars reply to a search request.

Proceeding from the terminal device, settings of the modem can be implemented via an integrated control channel.

For flow control of the transmitted data, the respectively receiving
30 terminal device or modem can output start/stop commands with which the data

transmission of the respectively transmitting terminal device or modem can be started or, respectively, stopped.

After the connection setup, echo data that make it possible for the modem to recognize whether the terminal device is active can be exchanged at periodic intervals.

The connection between the modem and the terminal device can be automatically cleared down after a predetermined time when the modem or the terminal device has received none of the echo data during this predetermined time.

For connection cleardown, cleardown data can be exchanged between the terminal device and the modem, whereby the resources of the connection are in turn released after the cleardown of the connection.

The present invention is explained in greater detail below on the basis of an exemplary embodiment and with reference to the accompanying Figures. Shown are:

- 15 Figure 1 the schematic structure of a system for the employment of the inventive method; and
- Figure 2 the executive sequence of the method for the setup of a connection from a terminal device to a modem via a local network.

Figure 1 shows two ADSL modems 3, 4 by way of example that can set up a connection between an ADSL line 5 and a local network, for example an Ethernet LAN 6. The ADSL modems 3, 4 can be connected to terminal devices (client) 1, 2 with the Ethernet LAN 6.

The method for the setup of a connection between a terminal device 1, 2 and a modem 3, 4 via the Ethernet interface 6 thereby sequences as follows:

- 25 Phase 1: Seeking the modem (modems) (steps S1, S2)

The searching terminal device 1, 2 sends a search request (modem request) to all ADSL modems 3, 4 attached to the Ethernet LAN network 6. A specific address is employed for this purpose (also called "limited broadcast address" 255.255.255.255 in IP networks), this leading thereto that the packet of the search request is received by all modems 3, 4 at the connected Ethernet segment. All

modems 3, 4 that support the protocol described here and have free resources over and above this, send a reply (modem reply). The terminal device 1, 2 receives all replies and is thus informed about all modems that still have free resources. Subsequently, the terminal device 1, 2 can select one of the available modems 3, 4.

5 Phase 2: Connection setup (steps S5, S6 [sic])

The terminal device now initiates a connection setup with the selected modem. Specific control packets (connect request, connect confirm) are exchanged for this purpose, these ultimately leading to a communication relationship (logical connection) between terminal device and modem. Each side thereby assigns a
10 number (session ID) that, in conjunction with the IP address, unambiguously identifies the communication relationship. Both numbers are contained in all following packets of the connection.

Phase 3: Control of the modem (steps S5, S6)

In general, the terminal device now sends various control commands to the
15 modem (similar to current, analog modems). Among other things, the modem can be informed of the destination telephone number to which a connection is to be set up. Moreover, various modem parameters can be influenced such as, for example, bit rate, compression method, error correction, etc. These control commands are based on the commands for analog modems but can also contain specific expansions for xDSL.

20 Phase 4: Data exchange (steps S7, S8)

When all settings have been made, the actual data exchange can begin, i.e. PPP packets can be sent bidirectionally via the connection between modem and terminal device. So that the reception buffers at both sides do not overflow, a flow control is provided according to the start/stop principle. Each receiver can thus stop
25 the transmitter of the cooperating party by sending a stop command and can restart it in turn with a start command. Moreover, the connection can, if desired, be monitored from both sides by periodic transmission of echo packets. As a result thereof, the

modem can recognize when the terminal device no longer reacts or has been switched off.

Phase 5: Connection cleardown (steps S9, S10)

- 5 In this phase, the connection between terminal device and modem is cleared down in controlled fashion. To that end, further control packets (release request, release confirm) are exchanged that ultimately lead to the release of the occupied resources.

Message flow

- 10 Figure 2 shows the typical message flow between terminal device and modem, beginning with the search phase (search request) up to an including the end of the connection. The individual messages exchanged between terminal device and modem or, respectively, vice versa are described in brief below.

Modem request (step S1)

- 15 This message is sent in order to find all modems connected to an Ethernet segment. The message is sent to all stations and, in addition to containing the layer-3 address of the searching terminal device, potentially contains further information such as user name, the desired bandwidth, the desired protocol, etc. These information can be interpreted by the modems, so that only those modems that can meet all requested demands reply.

20 Modem reply (step S2)

All suitable modems reply with this message and thus inform the terminal device of their own layer-3 address. This message is sent directly to the terminal device (no broadcast).

Connect request (step S3)

- 25 After the terminal device has selected one of the modems, the connection setup is started proceeding from the terminal device. To this end, the terminal device

sends a connect request message to the selected modem. The parameters contained in the modem request message should be repeated in this message and further parameters should be added, if necessary. The terminal device already assigns a session ID in order to enable an unambiguous allocation of the reply of the modem.

5 Connect reply (step S4)

The modem replies with a connect reply message that also contains its own session ID in addition to the session ID assigned by the terminal device. This message tells the terminal device whether the requested connection was accepted or refused. In case of an acceptance, the connection is in place and each side knows the session ID assigned by the other side, this being contained in all further messages. Given a refusal, the connection is cleared down from both sides.

Control (step S5)

Control commands can now be sent to the modem via the existing connection, similar to the case given analog modems. For example, the terminal device can interrogate various modem parameters such as type, the maximum bit rate, the dial capability, the ATM traffic classes that are supported, etc. The terminal device can also potentially influence some modem parameters and can initiate the setup of a dialed connection. In addition to the telephone number, other parameters that are required for the connection setup can also be indicated (for example, the ATM traffic class and the appertaining parameters such as peak bit rate and the like).

ControlAck (step S6)

Each control command is acknowledged by a separate message that can also contain the reply of the modem.

PayloadPacket (steps S7, S8)

This message contains the actual payload data, It can be sent in both directions between terminal device and modem. Payload data are transmitted

unprotected; the loss of payload data can therefore not be recognized within the protocol described here.

Stop

- This message can be sent in order to avoid the overflow of the proper
 5 reception buffer. When a stop message is received, payload data are no longer sent in the opposite direction until a start message is received.

Start

See above.

Echo request

- 10 This message is employed in order to check the availability and functionality of the respective cooperating party during an active connection. When an echo request is not answered with an echo reply message within a specific time span, the connection can be cleared down. For example, this mechanism allows the
 15 modem to clear down all active network connections when the terminal device was switched off without clearing the connection down in controlled fashion.

Echo reply

The reception of an echo request message is immediately acknowledged with an echo reply message. As a result thereof, the cooperating party is assured that the connection is still active.

- 20 Release request (step S9)

This message can be sent from both sides and serves the purpose of clearing down an existing connection. The reception of a release request message is acknowledged with a release confirm message by the cooperating party.

Release confirm

- 25 See release request.

Advantages of the disclosed method

The invention has the following advantages over known methods:

- No modem-specific data need be configured in the terminal device. The layer-3 address of the modem is determined by the method, and further modem parameters can also be automatically determined by the terminal device without a need for the user to intervene. A simple installation without specific technical expertise is thus enabled (plug-and-play).
- The method enables the direct control of the modem via an integrated control channel. As a result thereof, modem commands can be communicated like via a serial interface.
- The proposed method is significantly simpler to realize.

Possible expansions

The described method assumes that the terminal device already has a functioning Ethernet interface and an appertaining layer-3 address (for example, IP) address available to it. In order to likewise avoid this configuration event and enable a completely independent auto-configuration, the disclosed method can be combined with further protocols such as BOOTP or DHCP. To this end, the modem functions as a simple BOOTP (DHCP) server from which the terminal device can receive its configuration data. The configuration data (essentially the layer-3 address and a few other parameters such as sub-network mask) must be offered on the modem for this purpose. This can be carrier out by the manufacturer or by the network operator. The driver SW of the terminal device should be pre-set such that an automatic configuration ensues via BOOTP (DHCP) as well as with the method described here. Any and all user-side configuration is avoided in this way.

The disclosed method can also be expanded in that the search message (modem request) is transported across routers (similar to a BOOTP/DHCP proxy). As a result thereof, modems that are not directly connected to the local Ethernet segment but can only be reached via routers can also be found in larger networks. To this end, the router must contain a proxy function that forwards the sub-message to all connected Ethernet segments (or, respectively, to all segments that support broadcast).

The following advantages can, in particular, be realized by the present invention:

1. In the introduction of the automatic search event with whose assistance all connected modems can be automatically recognized.
- 5 2. In the introduction of a separate control channel via which the modem can be configured and controlled.
3. In the employment of a simple method for flow control between terminal device and modem.
4. In the combination with BOOTP or DHCP, as a result whereof a complete
10 auto-configuration is enabled.

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Patent Claims

1. Method for connecting terminal devices (1, 2) to external modems (3, 4), whereby a plurality of modems (3, 4) can enter into connection with the terminal devices (1, 2) with a local network (6), whereby the following steps are implemented
- 5 for the connection setup between one of the plurality of terminal devices (1, 2) and one of the modems (3, 4):
- sending a search request from the corresponding terminal device (1, 2) to all modems (3, 4) that are connected to the local network (6);
 - returning a reply to the terminal device (1, 2) from those modems (3, 4) that have

10 free resources available;

 - selecting one of the modem (3, 4) that sent a reply with the terminal device (1, 2);
 - and
 - connection setup proceeding from the terminal device (1, 2) to the selected modem (3, 4) by exchanging control information.
- 15 2. Method according to claim 1, characterized in that the external modems are ADSL modems (3, 4).
3. Method according to one of the preceding claims, characterized in that the local network is an Ethernet network (6).
4. Method according to one of the preceding claims, characterized in that
- 20 information for the connection setup and for setting the external modems (3, 4) are exchanged between the terminal devices (1, 2) and the external modems (1, 2) [sic] via an integrated control channel.
5. Method according to one of the preceding claims, characterized in that the search request contain [sic] further particulars about the required bandwidth and/or
- 25 the required protocol, and only those modems (3, 4) that can meet all requirements according to the further particulars reply to the search request of a terminal device (1, 2).
6. Method according to one of the preceding claims, characterized in that settings of the modem (3, 4) are implemented via an integrated control channel
- 30 proceeding from the terminal device (1, 2).

7. Method according to one of the preceding claims, characterized in that the respectively receiving terminal device (1, 2) or modem (3, 4) outputs start/stop commands for the flow control of the exchanged data with which the data transmission of the respectively transmitting terminal device (1, 2) or modem (3, 4) is started or, respectively, stopped.

8. Method according to one of the preceding claims, characterized in that, following the connection setup, echo data that make it possible for the modem (3, 4) to recognize whether the terminal device (1, 2) is still active are exchanged at periodic intervals.

9. Method according to claim 8, characterized in that the connection is automatically cleared down after a predetermined time when the modem (3, 4) or the terminal device (3, 4) [sic] has received no echo data during this time.

10. Method according to one of the preceding claims, characterized in that release information are exchanged between the terminal device (1, 2) and the modem (3, 4) for the connection cleardown and the resources of the connection are in turn released.

AbstractMethod for Connecting Terminal Devices to External Modems

The following invention is directed to a method for connecting terminal devices (1, 2) to external modems (3, 4), whereby the modems (3, 4) can connect to the terminal devices (1, 2) with a local network (6). The local network can, in particular, be an Ethernet network (6) and the modems are preferably ADSL modems (3, 4). For the connection setup between one of the plurality of terminal devices (1, 2) and one of the modems (3, 4), a search request is first sent from the corresponding terminal device (1, 2) to all modems (3, 4) that are connected to the local network LAN (6). Those modems (3, 4) that have free resources available send a reply to the terminal device (1, 2). The terminal device (1, 2) subsequently selects one of the modems (3, 4) that have sent a reply. This is followed by the connection setup proceeding from the terminal device (1, 2) to the selected modem (3, 4) by exchanging control information.

Figure 1

PCTWELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales BüroINTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE
INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)(51) Internationale Patentklassifikation ⁷ :**H04L 12/28, H04M 11/06,
G06F 13/38****A3**(11) Internationale Veröffentlichungsnummer: **WO 00/05839**

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(DE).**Veröffentlicht**

Mit internationalem Recherchenbericht.

Vor Ablauf der für Änderungen der Ansprüche zugelassenen
Frist, Veröffentlichung wird wiederholt falls Änderungen
eintreffen.(88) Veröffentlichungsdatum des internationalen Recherchenbe-
richts:

9. März 2000 (09.03.00)

(54) Title: METHOD FOR CONNECTING TERMINALS TO EXTERNAL MODEMS

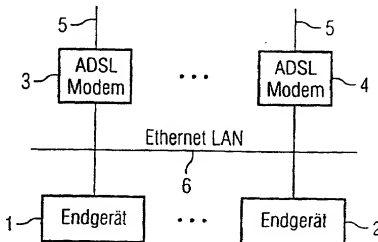
(54) Bezeichnung: VERFAHREN ZUR VERBINDUNG VON ENDGERÄTEN MIT EXTERNEN MODEMS

(57) Abstract

The invention relates to a method for connecting terminals (1, 2) to external modems (3, 4), whereby said modems (3, 4) can be connected to the terminals (1, 2) by means of a local area network (6). The local area network can be, more particularly, an Ethernet network (6) and the modems are preferably ADSL modems (3, 4). In order to set up a link between one of several terminals (1, 2) and one of the modems (3, 4), a search query is sent by the corresponding terminal (1, 2) to all modems (3, 4) that are connected to the LAN local area network (6). The modems (3, 4) with available resources send back a response to the terminal (1, 2), whereupon the terminal selects a modem (3, 4) from those that sent back said response. A link is then set up between the terminal (1, 2) and the selected modem (3, 4) by exchanging control information.

(57) Zusammenfassung

Die folgende Erfindung bezieht sich auf ein Verfahren zur Verbindung von Endgeräten (1, 2) mit externen Modems (3, 4), wobei die Modems (3, 4) mittels einem lokalen Netzwerk (6) mit den Endgeräten (1, 2) in Verbindung treten können. Das lokale Netzwerk kann insbesondere ein Ethernet-Netz (6) sein und die Modems sind vorzugsweise ADSL-Modems (3, 4). Zum Verbindungsaufbau zwischen einem der mehreren Endgeräte (1, 2) und einem der Modems (3, 4) wird zuerst eine Suchanfrage von dem entsprechenden Endgerät (1, 2) an alle Modems (3, 4) ausgesendet, die an dem lokalen Netzwerk LAN (6) angeschlossen sind. Diejenigen der Modems (3, 4), die über freie Ressourcen verfügen, senden eine Antwort an das Endgerät (1, 2) zurück. Das Endgerät (1, 2) führt daraufhin eine Auswahl von einem der Modems (3, 4) aus, die eine Antwort gesendet haben. Danach erfolgt der Verbindungsaufbau ausgehend von dem Endgerät (1, 2) mit dem ausgewählten Modem (3, 4) durch Austausch von Steuerinformationen.



1, 2...TERMINAL

1/1

FIG 1

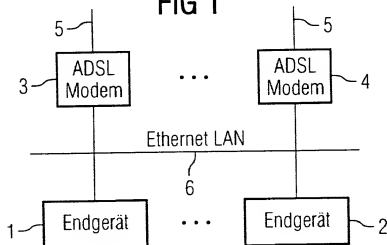
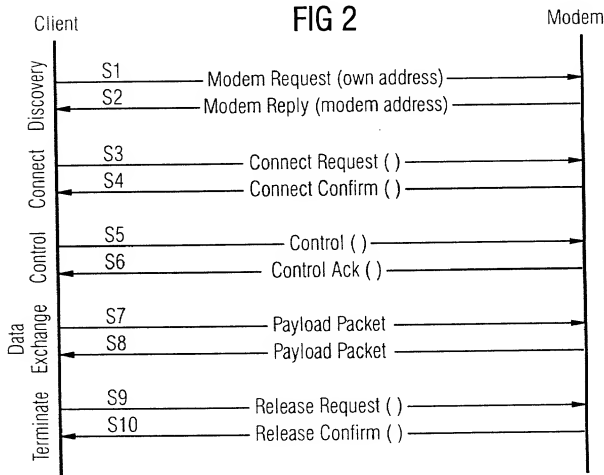


FIG 2



Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that.

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

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I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Verfahren zur Verbindung von Endgeräten mit externen Modems

deren Beschreibung

the specification of which

(zutreffendes ankreuzen)

(check one)

☒ hier beigefügt ist.

☐ is attached hereto.

☐ am _____ als

☐ was filed on _____ as

PCT internationale Anmeldung

PCT international application

PCT Anmeldungsnummer _____

PCT Application No. _____

eingereicht wurde und am _____

and was amended on _____

abgeändert wurde (falls tatsächlich abgeändert).

(if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

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I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

198 33 069.3 Germany 22. Juli 1998
(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☒ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
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(Status)
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German Language Declaration

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POWER OF ATTORNEY. As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint
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Second Inventor's signature

Date

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Residence

Staatsangehörigkeit

Citizenship

Postanschrift

Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben.)

(Supply similar information and signature for third and subsequent joint inventors)